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ABSTRACT

This report describes the current state of the art in recreational boating for physically disabled persons. It contains information on safety, independence afloat, emergency procedures, and access to and from boating facilities and boats. Areas in need of further study and research are suggested and an annotated bibliography is provided. (JD)

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A REPORT ON THE STATE OF THE ART

ED186409

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National Recreational Boating for the Physically Handicapped

STRATEGY PAPER & ANNOTATED BIBLIOGRAPHY

Submitted to:

UNITED STATES COAST GUARD
OFFICE OF BOATING SAFETY

by

HUMAN RESOURCES CENTER
ALBERTSON, NEW YORK 11507

1978

SP 016 005

SUMMARY

This report is the initial effort of the Research and Program Development unit of Human Resources Center to examine the state of the art in recreational boating for physically handicapped persons. This particular report is a strategy paper which will form the foundation for further research and development activities in the area.

This report:

- Describes the current state of the art in recreational boating for physically disabled persons.
- Categorizes this state of the art in terms of safety, independence afloat, emergency procedures, and access to and from boating facilities and boats.
- Suggest areas in need of further study and research.
- Provides an annotated bibliography

This report is released to disseminate information acquired through research, and does not necessarily reflect the official views and/or policy of the United States Coast Guard. This report does not constitute a standard specification, or regulation.

HUMAN RESOURCES CENTER

NATIONAL RECREATIONAL BOATING for the PHYSICALLY HANDICAPPED

A
Strategy Paper
Prepared under the Auspices
of the
United States Coast Guard
Office of Boating Safety
Policy Planning and
Information Analysis Staff.
(G-BP-1)

Federal Grant #99-1701-69

FOREWORD

"...as I watched, it occurred to me that it would be almost like riding on a cloud. I had always had a vague idea that I wanted to sail... Now I was sure. It looked as though once you had your sails set you could sit back and relax and dream forever".

Henry Viscardi, Jr.

HUMAN RESOURCES CENTER: An Overview

Human Resources Center is a private non-profit organization dedicated to providing educational, vocational, social, and recreational opportunities for the severely disabled. The Center's broad spectrum of programs encompasses job training and placement, academic and vocational education, independent living, research, and information dissemination. Founded in 1952 by Dr. Henry Viscardi, Jr., Human Resources Center is composed of three coordinated units: Abilities Inc., Human Resources School, and the Research and Program Development Institute.

Abilities Inc. conducts programs of work evaluation, training, job development, and career placement for the disabled. Its demonstration work center employs disabled adults in fields that include electronics, telephony, banking, data processing, and other clerical and industrial operations.

Human Resources School offers tuition-free education to over 230 severely disabled children. Chartered by the Board of Regents of the State of New York, it provides a full academic curriculum and extra-curricular program to previously homebound children from pre-kindergarten through high school level, as well as a summer camp.

The Research and Program Development Institute conducts research relating to the severely disabled, initiates and develops demonstration projects in rehabilitation and professional training, and disseminates information and program models nationally.

In August of 1977, Human Resources Center announced the establishment of a national Center on Employment of the Handicapped on its Albertson, Long Island campus. The national Center will help communities across the nation increase and enhance employment opportunities for millions of disabled Americans.

ACKNOWLEDGEMENTS

We wish to acknowledge the encouragement and support we received from our colleagues, particularly Dr. Frank Gentile and Roberta Housman. The early effort of Judy Young in getting this project underway is greatly appreciated. We would also like to acknowledge the patience and expertise of our secretary Regina Zedalis.

This project could not have been completed in its present form without the valuable assistance of its Advisory Panel members. (see appendix C)

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I. INTRODUCTION

This strategy paper was developed as part of a research project conducted by Human Resources Center for the United States Coast Guard, Officer of Boating Safety. (Federal Grant SUB 99-1701-89). The purpose of this project was to assist the U.S. Coast Guard in assessing the state of the art in recreational boating for the physically handicapped.

The project activities included a search of the literature, the development of an annotated bibliography, and a broad based data search. The data search involved contacts with national, state and local agencies and organizations. Requests for information were carried in all major recreational boating magazines, Coast Guard publications, and rehabilitation journals. Finally, information was solicited from more than fifty physically disabled boaters.

The report on the "state of the art" of recreational boating for the physically handicapped and the recommendations contained in this strategy paper centers on four areas: safety, independence afloat, emergency procedures, and access.

II. METHODOLOGY

A. Objectives and Work Plan

The overall objective of this project was to produce and disseminate a strategy paper and annotated bibliography dealing with the state of the art in recreational boating and boating safety for physically handicapped persons. A subsequent project will utilize this strategy paper as a guide in developing some detailed guidelines for recreational boating by physically handicapped individuals. These developing "guidelines" are not intended to constitute rules and/or regulations, but will be literally "guides" to assist physically disabled individuals in the safe participation in recreational boating.

The first activities undertaken to reach the objective included a survey of the literature, a survey of boating safety programs--both for handicapped and non-handicapped individuals, and the establishment of an Advisory Panel to monitor project development. The second set of activities included an analysis of the literature, the development and distribution of a questionnaire to physically handicapped boaters, and extended search for information which included Federal, State and local organizations, marinas, yacht clubs, manufacturers, and requests published by major journals in the field. An analysis of the information collected was submitted to the Advisory Panel for review and reactions. The third set of activities included preparation of a draft of the Strategy Paper, a review and critique by the Advisory Panel, a revision, production, and dissemination of the Strategy Paper.

B. Data Collection

The search for relevant literature continued throughout the term of this project. The staff regularly recieved current articles of an anecdotal nature; however, no significant material relating to the project as a whole emerged.

At this point, the staff believes that this project is uniques in the field of recreational boating, and that there is an urgent need for such a program.

The staff broadened the search for information beyond the category of "litearture." Boat manufacturers, marinas, yacht clubs, agencies, organizations, and individual boaters with physical disabilities were contacted. Information from these sources was received on a daily basis. Follow-up on these contacts was continued throughout the term of the project. This information covered a broad area. The remainder of this section represents a brief attempt to breakdown, summarize, and analyze these responses.

1. Boat Manufacturers

Ten manufacturers of popular production boats responded to inquiries. Three companies indicated that they have either made major modifications to meet the needs of handicapped boaters, or had received requests to perform such modifications. Seven boat builders wrote that they were willing to modify their boats to suit individual needs, but had received no requests to do so. Four other manufacturers wrote that the necessary modifications would be handled at the "dealer level".

Unlike automobiles, production boats can be more easily modified to meet the needs of physically handicapped persons. However, major modifications performed by the manufacturer do disrupt the assembly line creating production schedule problems, and are therefore not encouraged by the manufacturers.

The major modifications made by one manufacturer included raising the power craft's cabin sole, lowering the cockpit sole, and redesigning the interior furnishings to provide for a wider aisle to accommodate a wheelchair.

Other minor modifications that have been made include the installation of self-tailing winches, electric winches, and rollerfurling sails. In short, these are modifications that would facilitate centralized control by any boater.

Manufacturers of smaller crafts such as inflatables, canoes, and small outboards were not contacted, as their vessels are not susceptible to major structural modifications.

2. Marinas

The staff has recieved letters from three marinas, out of more than 50 that were sent letters of inquiry.

One municipal marina recently redesigned a ramp and floating dock to make them accessible to people in wheelchairs. It also allows disabled boaters to install devices which permit them to transfer to and from boats.

Another marina noted that dock attendants were available to assist all boaters, but that there were no special facilities designed for disabled individuals.

The Los Angeles County Department of Small Craft Harbors referred our letter to the Association of Santa Monica Bay Yacht Clubs.

California State Authorities indicated, however, that although county and state marinas provide access to "on-shore" facilities (i.e. toilets, restaurants, etc.) for people in wheelchairs, there were no provisions made to assist physically disabled persons to gain access to and from their boats.

The project staff has visited a number of local marinas. Generally, no special facilities have been provided to accommodate the needs of physically disabled boaters. Dockmasters indicated that Dock Attendants were available to occasionally assist physically handicapped boaters, if it did not conflict with their other duties. One facility had an electric golf cart which the facility staff used to make deliveries. The facility staff felt that it could also be used to transport disabled boaters from the shore to the end of the dock, but not to where boats are moored.

Most Dockmasters questioned by the staff had never given any serious thought to the needs of physically handicapped boaters.

3. Organizations

To date, the project staff has received responses from more than 55 organizations around the nation. These include federal and state agencies, as well as national and local groups.

a. Federal Agencies

The National Oceanic and Atmospheric Administration of the U.S. Department of Commerce referred the staff to various boat manufacturers.

The headquarters staff of the U.S. Army Corps of Engineers referred the project's inquiry to its field divisions, six of which responded with information or referrals. Some regions had no facilities for physically handicapped boaters. Others had modified their facilities for the physically handicapped, to provide access to the water, fishing piers and on-shore facilities (i.e. restrooms). They provided the project staff with the plans and designs for such facilities.

b. State Agencies

Appropriate governmental offices were contacted in all 50 states. To date, 21 states and the District of Columbia have responded. Of these, only nine failed to provide information, "thoughts", or referrals. None of the state agencies, however, were able to provide leads pertaining to the specific areas covered by the projects.

Those states that responded to the staff's letters included: Florida, California, the District of Columbia, Illinois, Ohio, Delaware, Oregon, Iowa, Wyoming, Nevada, Virginia, Montana, Mississippi, Alaska, New York, Texas, Alabama, Kansas, New Jersey, Missouri and Nebraska.

c. National Organizations

More than 15 national organizations replied to the staff's letters. Most of the responses either provided boating safety information for non-handicapped individuals, or suggested possible sources of information on boating safety for the physically handicapped.

d. Local Organizations

Over 20 local and/or regional organizations responded to the staff's initial letters requesting information. These institutions included colleges, city organizations, recreation centers, architectural consultants, rehabilitation centers and sailing schools. All expressed an interest in the project, but were unable to provide any of the information requested. However, most did suggest other potential sources of information.

C. Staff Activities

During the past months the staff has participated in a number of outside activities.

The National Boat Show in New York, which ran from January 14th to January 21st, was a vehicle through which over two dozen physically handicapped boaters were contacted. On January 13th, a trade day, the staff was able to personally contact a number of editors of boating publications, to insure further publicity for the project. Information about new products was also obtained. Numerous special organizations were contacted at the show and given information about the project. Responses from contacts made at the show were most useful.

On January 25th, the staff visited Mr. Charles Woodcock, Personnel Manager for the National Railroad Passenger Corporation (Amtrak) at Pennsylvania Station in New York City.

Mr. Woodcock provided the staff with information as well as a guided tour through some of the new railroad cars equipped with facilities designed for the physically handicapped. The staff was particularly interested in the "head" arrangements, and their potential for use on

various sorts of boats. (Inaccessible toilet facilities are one of the major constraints placed on the mobility and independence of physically handicapped individuals).

On Febraury 2nd, the staff attended a conference on adaptive aquatics sponsored by the American Red Cross in Greater New York. National Red Cross authorities on the topic were featured speakers.

Also on the same date, Ms. Pat Kilkenny of the United Cerebral Palsy Association of New York visited Human Resources Center. She received a briefing on the Recreational Boating Project, as she has expressed a particular interest in the program.

The staff attended the National Conference of the American Alliance for Health, Physical Education, and Recreation (AAHPER) in Kansas City, April 6-11,1978.

III. AREAS OF STUDY

This section reflects the state of the art in recreational boating for the physically handicapped. Information has been categorized into four areas to facilitate its analysis. The areas are: safety, independence afloat, emergency procedures, and access to and from boating facilities and craft. These categories are by no means mutually exclusive: however, they have proven useful in sorting out important information from what are essentially ancedotal reports. On occasion, therefore, the staff has chosen to treat the same information within two or more categories.

A. Safety

In their publication, Water Sports for the Disabled, the Royal Yachting Association Seamanship Foundation sets the appropriate tone for safety considerations for physically handicapped persons who are or may wish to become involved in recreational boating. On page two they write:

> "There is an element of danger in almost any activity one can think of, and everyone has the freedom to decide whether the enjoyment or pleasure derived from the activity is worth the risk involved.
>
> The disabled, however, start from an "at risk" position, so there is extra need to maintain acceptable standards of safety without denying them the freedom of choice or of putting other people at risk".

Thus, while this present report may focus upon some special safety needs of the physically disabled boater, it cannot overlook the special importance of general safety standards to these individuals. The United States Coast Guard placed boats into four different categories based on the length of the craft, and set safety standards accordingly. The categories are Class A (less than 16'), Class 1 (16' up to 26'), Class 2 (26' up to 40'), and Class 3 (40' up to 65'). The staff assumes that boaters will be aware of and will comply with these regulations, including those specifying the number and types of personal flotation devices (P.F.D.'s) that should be carried on board their craft.

United States Coast Guard statistics for fatal boating accidents that took place in 1976 reveal that deaths most frequently occurred in open motor boats under 16' in length,

that were cruising on lakes, ponds, or reservoirs under calm water conditions, with a light wind and good visibility, at temperatures ranging from 50° to 59°. The most common type of fatal accident was capsizing (people falling overboard came in second), most frequently caused by overloading the boat. (DOT-Coast Guard: Boating Statistics 1976 CG-357).

The May, 1978 issue of "Marine Business" (p. 134) reports on the Coast Guard's portrait of a typical boating fatality. Based upon the 1977 accident statistics, each of the following will be true in at least 50% of accidents:

> "The operator will be between 19 and 40 years old, there will be one to three people on board, and life preservers will either not be used or will be missing altogether. The accident will occur on a lake, or other inland body of water and, paradoxically, in fair weather with only moderate wind and excellent visibility. The boat most often involved in a fatal accident is an open design of less than 16 feet with less than 25 horsepower. The fatality will occur when the boat capsizes, swamps, or floods somewhere between 12:30 P.M. and 8:30 P.M. on a weekend. Twenty-five percent of the operators will have had no formal training in boating".

This information underlines the importance of personal flotation devices (P.F.D.'s) for physically handicapped boaters. P.F.D.'s, as well as all other safety-related pieces of equipment, should be stored in places where they are easily accessible to and usable by disabled persons. Handicapped individuals who are not strong swimmers would be well advised to wear their P.F.D.'s at all times. Disabled persons who are strong swimmers should bear in mind when considering whether or not to wear some form of life jacket, that falling overboard is the second leading cause of death in boating accidents.

People commonly assume that because P.F.D.'s bear the U.S. Coast Guard seal of approval, they will be equally effective for disabled and able-bodied boaters.

Boating programs for physically handicapped individuals usually insist upon the use of Coast Guard approved P.F.D.'s However, none of those contacted by the project staff have tested the effectiveness of these devices in connection with

various physical disabilities. It is essential that physically disabled persons water test their P.F.D.'s.

"We have not conducted tests to determine if a Coast Guard approved personal flotation vest can keep an adult up when they have full leg braces on", wrote one recreation official who operates a boating program for handicapped people. "We figure it will give us time to get to the person for help".

This may not necessarily be the case, and both handicapped and able-bodied individuals should be urged to test their P.F.D.'s under controlled conditions, before an emergency situation arises.

The staff feels that there is a critical need to review accepted boating safety standards, as they apply to physically handicapped persons. While 15.5 - 22 pounds of buoyancy (minimum requirements for U.S. Coast Guard approved Types I-III P.F.D.'s) may be sufficient to keep an average adult afloat, it is unclear if this would suffice for an individual wearing 20 pound leg braces.

Half of all wearable P.F.D.'s are designed to turn an unconscious wearer from a face down position to a vertical or slightly backward one. Leg amputees, however, have a different center of gravity due to their surgery, and it has been alleged that some P.F.D.'s actually tend to keep the heads of these individuals under water.

One firm has produced P.F.D.'s custom designed for individuals with various physical handicaps. Several other individuals have expressed to the staff the possible need to custom prescribe life vests for particular types of disabilities. However, little is being done in this field, as one Water Safety Specialist notes:

> "I can definitely say there is a lack of work being done on this subject. For instance, I could not tell you how a man with both legs amputated would float in the average type III P.F.D. I can tell you that his flotation characteristics would be greatly changed as the legs would normally be one-third of the body weight".

Both the American National Red Cross (Adapted Aquatics, p. 197) and Scouting/USA urge that disabled individuals be confident of their swimming capabilities before going out

on the water. This is recommended both to avoid anxiety on the part of the disabled person, and to insure his or her safety in the event of an accident.

In most boating situations, the distance that a person can swim is less important than his familiarity with the experience of being suddenly immersed. Confidence in the person's own ability to float, confidence in the performance of his life jacket, and knowledge of the physical effect of cold water upon him are of equal importance.

2. Bells

Federal law requires bells on Class 2 and 3 boats. It is essential that any bell carried aboard a ship be accessible to and usable by a handicapped individual in the event of an emergency.

3. Whistles

Federal law mandates hand, mouth, or power operated whistles audible for varying distances depending on the size of the boat, for Class 1, 2 and 3 vessels.

Portable, gas cannister operated horns would probably be the best device for disabled boaters, as they are the loudest type that can feasibly be carried on smaller boats, and require the least amount of manual dexterity to operate.

Several disabled boaters, in response to the project's questionnaire, voiced their concern about the speed at which help would arrive in an emergency. A power operated horn or whistle would be one way of quickly summoning assistance, or at least alerting nearby boaters to a problem.

Such devices should be kept in places where they are easily accessible to and usable by people with various disabilities.

4. Fire Extinguishers

Portable fire extinguishers are required on all power boats without fixed fire extinguishing systems, and on Class 2 and 3 boats with fixed systems in the machinery space.

U.S. Coast Guard approved hand portable fire extinguishers must be usable by any disabled individual on board a boat, and should be stored in locations that are easily accessible in an emergency.

This allows disabled boaters to assist able-bodied individuals should a fire occur on board or in a nearby boat, as well as enabling a disabled person to fight a fire alone if others should become incapacitated.

5. Bailers

Some appropriate device for removing water from a boat should be carried on all craft. Whether sponges, cans, buckets, or hand pumps, some device to remove water from the bilge should be accessible to and usable by disabled persons in the event of an emergency.

6. Radio Telephones

Although pleasure boats that do not carry passengers for hire are not required to have two-way marine radios, they can be very useful. In addition to providing weather information and casual communication between boaters, such devices can become essential in an emergency. Many common frequencies are regularly monitored by the Coast Guard, local harbormasters, and various land-based stations and can instantly relay requests for assistance to the proper authorities. Other boaters that hear a nearby call for assistance can also rush to the scene, sometimes arriving before rescue vessels. Radio telephones should be placed in positions that make them accessible to and operable by disabled individuals in case of an emergency.

7. Lights

The U.S. Coast Guard prescribes the type of lights required on the various classes of boats. However, no provisions are made to accommodate the needs of the color blind mariner. Over 17% of the male population of the United States are red-green color blind. Traffic lights in many states have been adapted to assist these individuals in making the red-green distinction.

8. Boats

Of course, basic safety begins with the craft itself. Adequate handrails, large hatches, level flotation, self-fighting capabilities, and numerous other factors will be designed into the boat by a responsible manufacturer. It has almost become a truism that any improvement in the safety features of a boat will serve both handicapped and non-handicapped alike.

In short, all craft used by a physically disabled boater or a craft carrying a physically handicapped person should be modified to insure access to all required safety equipment by the physically disabled individual.

B. Independence Afloat

A major factor attracting the physically disabled person to the activity of recreational boating is the potential for an enhanced sense of independent function. Recreational boating, in addition to the obvious value of outdoor activity, provides an ideal opportunity for the development and enhancement of the sense of mastery and control, feelings of group identity, and the expression of healthy competitive strivings. Physically disabled persons have often found it difficult to devise opportunities in their daily vocational activities for the attainment of these necessary motivational components and therefore must seek them through their recreational outlets.

Anecdotal reports from disabled boaters reveal the sense of vital significance of these factors. These reports range from a stage of initial discovery by a physically handicapped person of this "new found" independence to the winning of an international boating championship by a paraplegic person.

A blind sailor writes: "Life can be dull for a blind person. We have our group activities, but in sailing,we have a chance to be more independent. We can never drive a car or ride a bicycle, but out here, steering and controlling the boat gives us a chance to experience power and pleasure we can't get in any other way".

The physically disabled person's need for independent function evinced by mastery, control, competitive and compensatory drives can be attained and are readily available through participation in recreational boating. Though these motivational components vary in intensity in each physically disabled boater and the degree of independent function attained is directly proportional to the ingenuity and adaptive capacity of the individual, the means to facilitate such attainment should be provided.

1. Class A Boats

Independence afloat for the handicapped as well as for the non-handicapped person increases with the individual's increase in competency and mastery of basic boating skills. Red Cross courses in canoeing, sailing, rowing, and motor boating, are but one example of the sources of information and training that are essential for the competency and mastery that produce a real sense of independence afloat in all boaters. Such information and courses are available at little or no cost to the individual.

Physical adaptations to Class A boats to meet the needs of physically disabled boaters are relatively simple and easily made. In all Class A craft, seating can be a problem for the disabled person. Stability for balance and comfort are prime factors. Yet, simple solutions are easily created. Canoe seats have been built using a plastic form-fitting contour seat. Wood blocks are used to give it height. A base of plywood with a strip of rubber automobile tire complete the operation. This seat can then be placed into a canoe with the back up against the stern seat and resting against it.

Various adaptations have been made to the oars of canoes, rowboats and inflatables to facilitate their effective and efficient use by disabled boaters; such adaptations include altering the length of the oars and size of the hand-hold. Also, various sorts of padding are utilized to increase the comfort of the hand-hold of the oars.

Of special concern to the physically handicapped, small sail boat operator is the adaptation of the rigging to meet any needs. The large selection of "hardware" available for sailboats - such as jam-cleats, winches, roller-furling sails, etc., allow for a great variety of adaptations, most of which are easily installed. The general requirements for centralized control of a sailing vessel will usually meet the needs of the disabled sailor as well.

The disabled individual who chooses to become involved in the operation of a small motorboat may encounter some difficulty in handling the controls of an outboard motor. In such cases, the individual will find commercial remote controls available and easily adaptable for various physical handicaps. One boater reports operating his eleven foot dory with outboard motor from a wheelchair.

The remaining kind of adaptation that may be required by Class A craft to provide independence, as well as safety, for the disabled boater, would be an arrangement that would allow for easy handling of both anchor and/or mooring lines. Such lines, where required, should be available to and recoverable by the boater.

2. Class 1 Boats

Class 1 boats, ranging from 16 to 26 feet in length, require additional skills and knowledge to attain true

mastery and competerce. Therefore, it becomes even more important that both handicapped and non-handicapped boaters have at their disposal the fundamental skills and knowledge contained in basic sailing and/or power boating courses. These courses are offered free of charge by the U.S. Coast Guard Auxiliary, U.S. Power Squadrons, American Red Cross, and by state and local organizations.

To attain independence afloat, the physically disabled boater, in addition to basic seamanship, should give special attention to controlling the craft, and to seating and movement about the craft.

In the case of power boating, "control of the craft", includes not only engine and steering controls, but control over docking, mooring and anchoring procedures. It may also include access to navigation aids such as compass, charts, etc. Independence afloat on Class 1 power boats also requires that the boater have enough movement about the boat to gain access to areas that might require repair while afloat as well as access to the head facility - where available.

The control of a Class 1 sailboat requires not only access to steering and auxiliary engine controls (where present), but to the rigging as well. Recent designs, such as the "Hood System", have made sail handling from the cockpit area possible and thereby reduced the need for an experienced crew. Seating in sailboats in this class may require some adaptation to allow the individual to change position when coming about. As in the case of powerboats, independence in sailboats requires adaptive techniques for docking, mooring, and anchoring procedures. Design and location of adequate handholds and other "hardware" can also contribute to the sailor's sense of independence. The installation of wheel steering may also facilitate control of the craft by physically disabled sailors.

3. Class 2 Boats

Class 2 boats, ranging in size from 26 feet to 40 feet in length, also require knowledge of and skills in basic seamanship. The independence sought after by all yachtsmen takes the form of a continual search for methods and adaptations which will provide them with more centralized control. This would also apply to the physically handicapped boater. Boats of this size require special attention be given to matters of docking, mooring and anchoring, especially by the physically handicapped boater.

Powerboats in this size range are able to produce a reliable and continuous source of electric power. This is of advantage to handicapped individuals in that they may utilize a number of devices, such as electric lifts, winches, etc., to facilitate their movement about the boat. Electric winches are also useful in assisting in the retrieval of anchors, which can pose a problem even for the non-disabled. Also, there is a wide range of electronic aids to navigation, electronic controls such as automatic pilots, etc. available to the powerboater.

Class 2 sailboats, on the other hand, depending as they do upon the wind as the major propulsion source, do not have an equally reliable, continuous source of electric power. Therefore, electric and electronic aids are not as available for sailboat operators and other sorts of adaptations must be sought where necessary.

4. Class 3 Boats

Boats ranging from 40 feet to 65 feet in length are classified as Class 3. Such craft constitute only about 1/3 of one percent of the total recreational boats in the U.S. From the point of view of a physically disabled boater, sail and powerboats in this class are somewhat equalized as to advantages. Restrictions here revolve mainly about costs. Initial costs of such boats, plus maintenance cost and possible crew requirements limit the number of such craft. However, any physically handicapped individual who can afford a Class 3 boat will be able to have it custom adapted to meet his particular needs.

C. Emergency Procedures

Emergency procedures are the "insurance policy" of recreational boating. Basic emergency procedures are spelled out in most courses dealing with small boat handling. However, these procedures require careful review in terms of the needs of the physically handicapped individual. Specific emergency procedures will vary with the type of craft; however, four basic requirements need to be reviewed for possible adaptations for physically disabled boaters regardless of type of craft.

1. Swimming

Boating courses offered by the American National Red Cross and by the Sea Explorers of the Boy Scouts of America require a basic swimming competency prior to taking their boating courses. The American National Red Cross has adapted both its swimming course and its swimming requirements to meet the needs of physically impaired persons. The ability to swim

provides the individual a margin of safety, a heightened sense of independence, as well as constituting a fundamental part of any emergency procedure. Neither the Coast Guard Auxiliary nor the U.S. Power Squadrons require swimming as a pre-requisite for their courses in boating. Organizations should be encouraged to require a minimal competency in swimming, and certainly it should be strongly recommended in the case of physically disabled persons.

There can be no substitute for water confidence to insure proper reactions to emergency situations. Such confidence is gained only through actual in-water experience.

2. Access to Emergency Equipment

It is, of course, a truism that emergency equipment is useless unless it can be got to in an emergency. Special notice of this must be made in the case of physically disabled boaters. Radios, horns, fire extinguishers, life rings, P.F.D.'s etc., all should be located where the physically impaired individual can get to them in a reasonable amount of time. The careful and thoughtful location of emergency equipment will not only benefit the disabled individual, but will decrease the emergency response time of all boaters.

In many instances, it will be important that the physically disabled boater take aboard and use his own "personalized" P.F.D. In the case of some handicapped individuals, the category of "emergency equipment" may also include medicines, medical equipment, and essential medical knowledge.

3. Emergency Drills

It is particularly important that the physically disabled boater, whether operator or passenger, be familiar with emergency procedures appropriate to the particular craft. The "run-through" of emergency procedures will provide the individual with an increased sense of mastery and independence. Further, it will serve to decrease the response time of all individuals to emergency situations. The appropriate type of emergency drills will vary with the type of boat. These will be mentioned in connection with the specific type of boat later in this section.

Too few individuals think through the possibility of a boat operator falling overboard or being suddenly incapacitated. Can the passengers/guests recover the person overboard? Can they function to safely bring the craft to shore, harbor or anchor? Do they know how to summon help? The National Safety Council has produced a pamphlet entitled Suddenly in Command which addresses this issue.

4. Survival

A recent and growing concern among those persons involved in boating safety has to do with the in-water survival of victims of boating accidents. There is an increasing awareness that many "so called" drownings may have been caused by hypothermia, rather than by the victim's inability to swim or cling to a flotation device. A number of manufacturers are developing and producing a line of "survival" jackets and suits. Most of the jackets combine the flotation capacity of a P.F.D. along with some protection against excessive hypothermia. The physically handicapped boater will benefit from this development in two ways. First, the combination of a warming flotation jacket will reduce the restriction mobility often imposed on the disabled boater by wearing two pieces of bulky apparel. Second, the general comfort of the boater is improved. For the disabled boater, required adaptations may be made to a single garment.

5. Class A Boats

Class A boats account for the largest number of boating fatalities by far. The major cause is capsizing. The second most frequent cause is falling overboard. Emergency procedures involving this class of boat will differ from those required on larger craft. Here, the ability to swim goes beyond that of a safety factor, and becomes a part of any emergency procedure by virtue of the fact that any emergency on Class A boats are caused by capsizing. Therefore, emergency procedures should include the knowledge and skills required to recover from a capsize, recovery not only of the person, but of the craft itself.

It is also essential that under no circumstance should a physically handicapped person be strapped in or otherwise confined to any small craft. In the event of a capsize, all individual must be able to get free or be thrown free from the boat.

For example, the canoeing and rowing course of one camp requires as a "final exam" that the handicapped children capsize their craft, swim with it into chest-deep water, right the craft, and re-enter it from the water. This drill gives the disabled child a great measure of confidence, and more importantly, the independence to use the canoes and boats with minimum supervision.

It also is of importance that the physically handicapped boater (in Class A craft) wear a personal flotation device rather than just carry it on board. Because of the high probability that an emergency situation on a Class A boat will result with the boater(s) in the water, special attention should be given to protection against hypothermia. This is especially true when boating in early spring and/or in cold waters.

6. Class 1, 2 and 3 Boats

The most important of emergency procedures for these larger boats concerns "person overboard" procedures. In addition to the procedures prescribed by the Coast Guard and Power Squadrons, the physically handicapped boater needs to give particular attention to any special adaptations to either procedures or craft to ensure capability to recover the physically handicapped person from the water.

One other aspect of emergency procedures that may require special attention by physically handicapped boaters in Class 1, 2 and 3 boats is the ability to put oneself into the water. In short, over concern with securing a handicapped person to the craft may result in overlooking an emergency, such as a fire, which would require a rapid "abandoning of ship". The disabled boater must consider his or her potential for executing this procedure and make adaptations accordingly.

While none of the physically disabled respondents to our inquiries indicated any special need for additions or modifications to U.S. Coast Guard emergency procedures, several indicated that they would like to be better informed as to the response time of the Coast Guard to a request for emergency assistance. Inquiry was also made regarding the possibility of a special code to inform the Coast Guard of the fact that a handicapped person was involved in the emergency situation. Queries were also raised as to the possibility of a special flag that could be flown whenever a physically handicapped person was aboard.

D. Access

The elimination of architectural barriers that prevent physically handicapped individuals from engaging in recreational activities is a natural offshoot of federal and state regulations requiring that work environments be barrier-free.

Much has been published and many designs are available for providing barrier-free access to recreational areas. This includes wide parking spaces reserved for handicapped individuals which allow four feet of extra room to permit people to transfer to and from wheelchairs; curb cuts to permit easy movement from the parking lot to the sidewalk; ramps instead of steps to permit access to buildings; and accessible bathrooms and water fountains.

To a certain extent, some information has been published about making dock areas accessible to the physically handicapped, however there is very little information pertaining to access to and from boats once the disabled person gets to the water's edge.

1. Dock Design

The United States Department of Housing and Urban Development, in its publication Barrier-Free Site Design (p. 55) notes that:

> The problems are primarily, (1) access to the boat, and (2) the inclusion of supportive devices within the boat itself.
>
> Specifically, the following factors should be considered:
>
> a. Access to the docks should be over hard surfaces, free of clutter, and devoid of situations which might prove hazardous for the person with a physical limitation.
>
> b. Docks should have handrails and railings 3'-10" high, designed in such a way as to allow a person to support himself while he travels along the dock, as well as while he enters the boat.
>
> c. Entry of the boat from the side of the dock should always be from a position perpendicular or parallel to the dock. These two positions allow for the safest entry into a boat.
>
> d. Once within the boat, hand grasps or rails should be provided to assist a person in moving about. This pertains mostly to larger boats, as the addition of such equipment could present more potential hazards than benefits in a small boat or canoe.

HUD also recommends that access to dock areas be provided via firm paved surfaces suitable for use by people in wheelchairs. It suggests that ramps leading to floats be at least 32 inches wide without any obstructions within those dimensions, and have a maximum gradient of 10%.

Extending the top railing 18 inches over the water so it then gently curves downward and fastens to the base of the dock or float provides stabilization for people entering and leaving boats, according to HUD.

Some public marinas have modified their facilities to accommodate physically handicapped boaters.

One Dock Master reported that they had just enlarged their marina and in the process provided a ramp and floating dock adapted for wheelchair use. Wheelchair access around the entire marina was also provided. This marina will permit dockside installation of a lift to assist a physically handicapped boater to get in and out of his boat.

The U.S. Army Corps of Engineers standards state that "walkways and stairways from shore to dock shall have a minimum of one handrail, approximately 42 inches in height, with a guardrail approximately 22 inches in height below the handrail". (Little Rock District Corps of Engineers).

A "Fixed Courtesy Dock for the Handicapped" has been constructed by the Corps at Rocky Point on the Chattahoochee River. Plans are available by writing to: U.S. Army Engineer District, Savannah; Corps of Engineers; Savannah, Georgia. The facility was built as part of the West Point Project Recreational Facilities program. However, it has no special features to assist people in transferring from the dock to a boat, other than a 2' 2" wide opening in the railing, with a 2" thick vertical grab bar made out of pipe, standing on each side of the opening.

"Where there's a will, there's a way"! This ancient saying best describes the numerous ways that physically handicapped individuals have resolved the problem of access to and from their craft. However, it is clear that some research and engineering effort could help to alleviate some of the problems of access.

2. User Lifts

One method of transferring from the dock to a boat is through some sort of mechanical, electric or hydraulic lift. Some of these are designed to be installed on boats, thus giving the boater access to facilities at other locations. Such lifts have been further adapted to give the disabled boater easy access to and from cabin and deck.

A California manufacturer produces a bed lift hoist motorized for both horizontal and vertical movement, which can be operated by a handicapped individual or an attendant without any physical effort on their part. A bar supported by two sets of poles is erected across the person's bed, and a sling-chair raises the individual off the bed and moves him or her horizontally towards a waiting wheelchair. Such a device could easily be installed over a slip, and be used to transfer a person from a wheelchair into a smaller boat.

Hydraulic lifts are devices which can be fastened onto a dock, and can raise a person in a wheelchair to the boarding height required for a larger boat. Numerous models are available to reach various heights.

Numerous individuals have created an assortment of home-made devices to provide access to their boats.

Skip Wilkins is a quadriplegic from Virginia Beach, Virginia. As reported in the November/December 1975 issue of Sports 'n Spokes magazine (p. 13):

> "To board the boat, Skip had a simple frame made from 4" pipe with a boat winch attached. Skip, still seated in his wheelchair, is hoisted aboard his boat and then he transfers into his adapted boat seat".

Bob Hawkes, a paraplegic who sails a 14 foot Hobie Cat, describes how he boards the craft:

> "I fortunately have a small beach but this is not absolutely essential. My wheelchair is an old one which I use only in the water. I pull the Hobie off the beach until it is just touching the bottom so that when I transfer on board it will be grounded fairly hard. Since the canvas trampoline is quite coarse and can cause chaffing of the skin of the buttocks, I place one inch thickness of foam rubber 5' x 6' in area over the canvas and on top of this an old army blanket with short pieces of line attached to each corner to tie to the corners of the aluminum wing (trampoline frame) to keep it taut. This makes a nice smooth surface to slide around on when changing positions in the craft. I would suggest that a waterproof mat the same size would be as good or better since

this often gets soaking wet while sailing and you sit in water the rest of the time you are sailing that day. This is also unpleasant for your passengers".

"It is easy to transfer aboard from the wheelchair. Hardly any lift at all. The height of the boat is almost even with the wheelchair height. Once aboard, it is very easy to rig up the sail by lying on the back and hauling up the sail on the main halyard with one hand while feeding the sail into the slot with the other. The Hobie can be pushed on and off the beach without help from another. I frequently paddle out from the beach to my mooring to put up the sail if the winds are strong or changeable".
(Sports 'n Spokes, Nov./Dec. 1977, p.8)

Physically disabled boaters responding to the projects staff's inquiries, as well as individual letter writers, offered other suggestions.

One yachtsman suffers from paralysis of his left arm and hand. He had to be lifted onto his boat until he purchased a Master two-step steps, and placed it on the stern deck of his boat. The device consists of two steps placed on either side of a short platform, and permits him to walk directly from the dock into the cockpit, or from the cockpit onto the dock.

Physically disabled boaters responding to the inquiries generally indicated that they used few assistive devices to board the boat, either doing it independently or requiring assistance from one or two individuals to lift them aboard their vessels.

However, many asserted that they preferred to use no special devices. They feel that it is too easy to become dependent upon them. Special dockside equipment may not be available at the next port.

Most physically disabled boaters, contacted by the staff, evoked a rather independent spirit, using a minimum amount of assistive devices, if any. Often these were limited to extra grab bars and railings. Amputees tended to support the theory that "if there is a will, there is a way". Paraplegics, having more weight to move around, tended to rely more on assistance from individuals or assistive devices to help them board their boats.

Several people indicated that they used electrical lifts, and mechanical devices (i.e. blocks and tackles connecting bosun's chairs to the halyard, hydraulic lifts, etc.), to board and disembark from their vessels.

IV. GENERAL SUMMARY AND CONCLUSIONS

A. The State of the Art in Recreational Boating for the Physically Handicapped

Recreational boating affords the physically handicapped individual with a recreational activity that can be mastered in spite of a wide range of physical limitations. It provides the physically handicapped with a source of social contact with non-handicapped - a contact which can work to the mutual benefit of both groups. With little or no modification to the craft, some form of recreational boating can be made accessible to most disabled persons.

The significance of recreational boating for physically disabled persons may be overlooked by non-disabled individuals. Non-disabled persons should be reminded that over twenty million Americans are physically handicapped. In the general population there exists some ten-million boats and some forty million persons who are regularly engaged in boating activities. If this were to hold true for the physically disabled portion of our population, then we are dealing with a potential of one million boats and four million physically disabled boaters.

Given these factors, it is little wonder that recreational boating is gaining in popularity among physically disabled individuals. Boating programs at summer camps, commercial organizations, and yacht clubs are beginning to extend their programs to include the physically disabled. The Department of Commerce projects a seventy-five percent increase in recreational boaters during the next two decades. The national trend toward the increased use of boating by both handicapped and non-handicapped persons as a major source of recreation is clearly in evidence. This fact makes it imperative that the opportunities for the physically handicapped in this recreational activity be fully explored.

A review of the State of the Art in recreational boating for the physically handicapped reveals that there has been no systematic effort to explore the general needs of the disabled to facilitate their full and safe participation in this recreational activity. In the process of ascertaining this state of affairs, it became obvious that there exists a pressing need for physically disabled persons to be made aware of the recreational possibilities in boating activities. However, there also exists a need for non-handicapped persons currently involved in either recreational boating and/or the recreational boating industry to be made equally aware of the recreational boating possibilities for physically disabled persons.

B. Areas for Further Study and Research

The State of the Art in recreational boating for physically handicapped individuals clearly reveals the need for a set of guidelines. Specific guidelines covering the areas of safety, independence afloat, emergency procedures, and access should be developed and the needs within these areas carefully delineated. These will be discussed below. However, the very existence of a set of guidelines would serve to meet the very important need of sensitizing both the general public and handicapped individuals to the recreational opportunities afforded by the various forms of boating activities.

1. Safety

There can be little question that in matters of boating safety, there is no substitute for good boatsmanship and a sound craft. Materials utilized by boating safety courses offered by such agencies as the U.S. Coast Guard Auxiliary, the U.S. Power Squadrons, and the American Red Cross, provide basic safety guides for all persons engaged in recreational boating. The "state of the art" does not reveal any need to alter the basic safety requirements contained in these materials in order to provide for the safe boating needs of the physically handicapped boater. Rather, what seems to be required is certain supplementary guidelines to enhance the safe participation of physically disabled persons in recreational boating activities.

Of particular importance is the development of guidelines concerning personal flotation devices (PFD's). These guidelines should include a warning to physically handicapped boaters to give an in-the-water test to their Coast Guard approved PFD. Certain physical disabilities and/or the wearing of certain prosthetic devices may alter the flotation characteristics of the PFD. The physical disabilities to which such a warning is most applicable should be specified. Certain modifications of Coast Guard approved PFD's may be adequate to insure their safe functioning when used by a disabled person. However, in some cases a special design will need to be created to meet the individual safety needs of persons with physical disabilities.

This raises a different sort of issue. What sort of mechanism should be established to permit a PFD, custom designed for a physically handicapped person, to acquire the "Coast Guard Approved" label? This labeling process is of prime importance to operators of public and private boating facilities, boating courses, etc., because of insurance-cost factors.

Guidelines in the area of safety must serve to emphasize not only the need for appropriate safety equipment, but that the physically handicapped boater has access to this equipment. Equipment and access problems will vary, of course, with the type of boat.

The guidelines should also stress water safety skills. In the case of a Class A boat, for example, swimming abilities should be stressed, along with cold water experience.

The increasing use of pontoon boats for recreation for physically disabled persons should be subject to careful scrutiny of the safety factors. Methods of safely chocking wheelchairs to the deck of these craft should also be examined.

2. Independence Afloat

The guidelines dealing with the topic of independence afloat should emphasize the remarkable degree to which a small modification to most craft can give the disabled boater full control over its operation. It is this ability to have physical control over the operation of a boat that produces the psychological sense of independence. In fact, it is this reported feeling of independence that attracts physically disabled persons to recreational boating activities.

The need for guidelines in this area is to underscore the fact that neither safety requirements, emergency considerations, nor problems of access constitute insurmountable obstacles to the active participation of physically handicapped individuals in some form of recreational boating. Those factors which insure the rewarding experience of independence and mastery are those which insure safe and sane boatsmanship for all participants, handicapped and non-handicapped alike.

However, the guidelines should not obscure the fact that all forms of boating involve "risk-taking". Physically handicapped persons cannot expect the elimination of normal risks taken by all participants.

3. Emergency Procedures

Emergency procedures require special consideration in any guidelines dealing with recreational boating. Procedures appropriate to the various classes of boats must be reviewed to highlight those aspects which require additional elaboration for the benefit of physically disabled persons. In general, the area of water safety procedures, including survival, will

need to be examined. The importance of emergency procedure drills will need to be underscored so that the physically handicapped boaters can better judge their physically needs and psychological reactions to emergency situations. Emergency drills are invaluable experiences that effectively determine the location of any emergency equipment to insure access by handicapped individuals, whether they be boat operators or merely passengers.

4. Access

A major area still in need of basic research and development is that of access. Few marinas have given any thought to access by physically handicapped individuals. This remains true even though Section 502 of the Rehabilitation Act of 1973 Public Law 93-112, provides the means for insuring compliance with the standards of the Architectural Barriers Act of 1968 amended by the Act of 1970. The requirement to remove all such barriers applies to all facilities supported with public funds. Architectural barriers to marina facilities are easily removed; guidelines and designs are available, it is a matter of their implementation. However, neither guidelines nor designs exist to facilitate access to and from boats by disabled persons. Tidal waters present additional access problems for the physically handicapped persons.

The purpose of guidelines in this area are threefold. First, they can emphasize and facilitate the implementation of the removal of architectural barriers to marina and boating facilities. Second, the guidelines can explore and catalog some means to facilitate access to and from a boat by physically disabled persons. And third, they can include some suggestions of how able-bodied persons can assist the physically handicapped with problems of access.

C. Conclusions

Clearly, there is a pressing need for a set of guidelines for recreational boating by physically handicapped individuals. They are needed to encourage the safe participation by the handicapped in this recreational activity. They are needed to communicate the availability and accessibility of this area of recreation.

The function of such guidelines should not be to add more "rules and regulations" to a recreational area that many feel to be already over regulated. Rather, these guidelines should serve to supplement and/or emphasize existing safety recommendations and emergency procedures. They should serve to sensitize the general public to the access problems of the physically handicapped in availing themselves of this recreational activity. And finally, these guidelines should highlight the values inherent in recreational boating for the physically handicapped in our society.

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A 10 section student workbook covering handling under normal conditions, handling under adverse conditions, seamanship and common emergencies, rules of the road, compass and chart familiarization, aids to navigation, running lights and equipment, inland boating, mariner's compass and piloting, and boat trailers.

Appendix A

HUMAN RESOURCES CENTER EXECUTIVE STAFF

Henry Viscardi, Jr., LL.D, L.H.D., Litt. D., Sc.D., F.R.S.A.
President, Chief Executive Officer
Human Resources Center

Arthur Nierenberg
Executive Vice President, Human Resources Center
President of Abilities Inc.

Frank D. Gentile, L.H.D.,
Vice President and Secretary, Human Resources Center
Director, Research and Research Utilization

Robert M. Gibney, M.A.
Acting Superintendent, Principal
Human Resources School

Mel Holtz, M.A.
Vice President and General Manager, Abilities Inc.

Michael Jennings, J.D.
Vice President and Treasurer, Human Resources Center
Director, Administrative Services

Lawrence R. Lynn, M.A.
Director, Development, Human Resources Center

Appendix B

RESEARCH AND PROGRAM DEVELOPMENT STAFF

Frank D. Gentile, L.H.D.
Vice President, Human Resources Center,
Research and Program Development

John D. Worrall, Ph.D.
Director of Research

David A. Molinaro , M.A.
Director of Research Utilization

Roberta Y. Housman, B.S., R.N.
Director of Rehabilitation Projects

John T. Palmer, Ph.D.
Director of Educational Projects

PROJECT STAFF

Eugene Hedley, Ph.D.
Project Director

Zack Brauer
Project Assistant

Regina Zedalis
Project Secretary

Appendix C

PROJECT ADVISORY PANEL

Irving M. Clyne, M.D.
Psychiatrist and member of the U.S. Power Squadrons

Ken Freund
(Ex Officio)
United States Coast Guard

Michael A. Gitt
Director of Marine Activities
Great Neck Park District

Norman A. Hamlin
Professor of Naval Architecture
Webb Institute of Naval Architecture

Thomas L. Leitch, Jr.
Annapolis Sailing School

G. James Lippmann
Executive Director
American Boat and Yacht Council

Ron Olson
Field Representative - Safety Programs
The American Red Cross in Greater New York

Howard E. Schroedel
President of Cruises for the Handicapped, Inc.
Flotilla Commander, Public Relations Officer and Instructor in boating safety with the U.S. Coast Guard Auxiliary

Jerry Seckler
Assistant to the Deputy Commissioner
Nassau County Department of Recreation and Parks

Peter Stern, M.D.
Director of Rehabilitation
Burke Rehabilitation Center